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*Teacher  
Answer  
Sheets*

# How is Electricity Produced?

## 2.1 Types of Power Plants and Generation

### Activity C: A Combustion Turbine

#### Teacher Answer Sheet

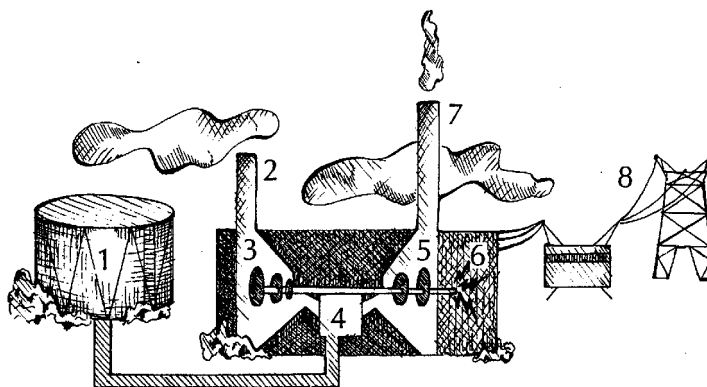
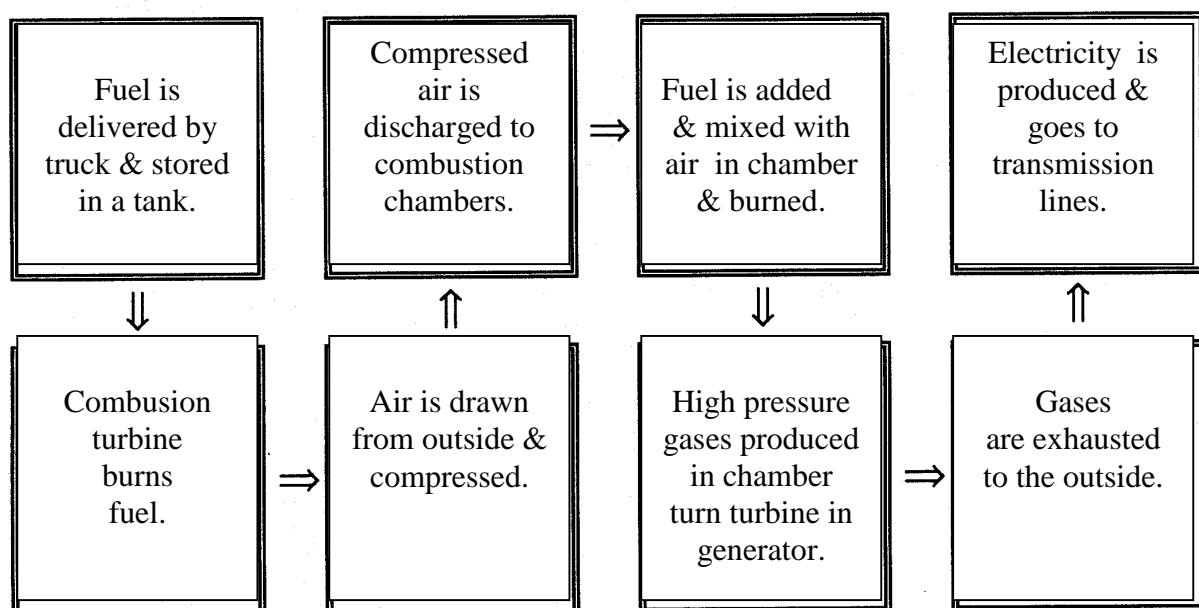


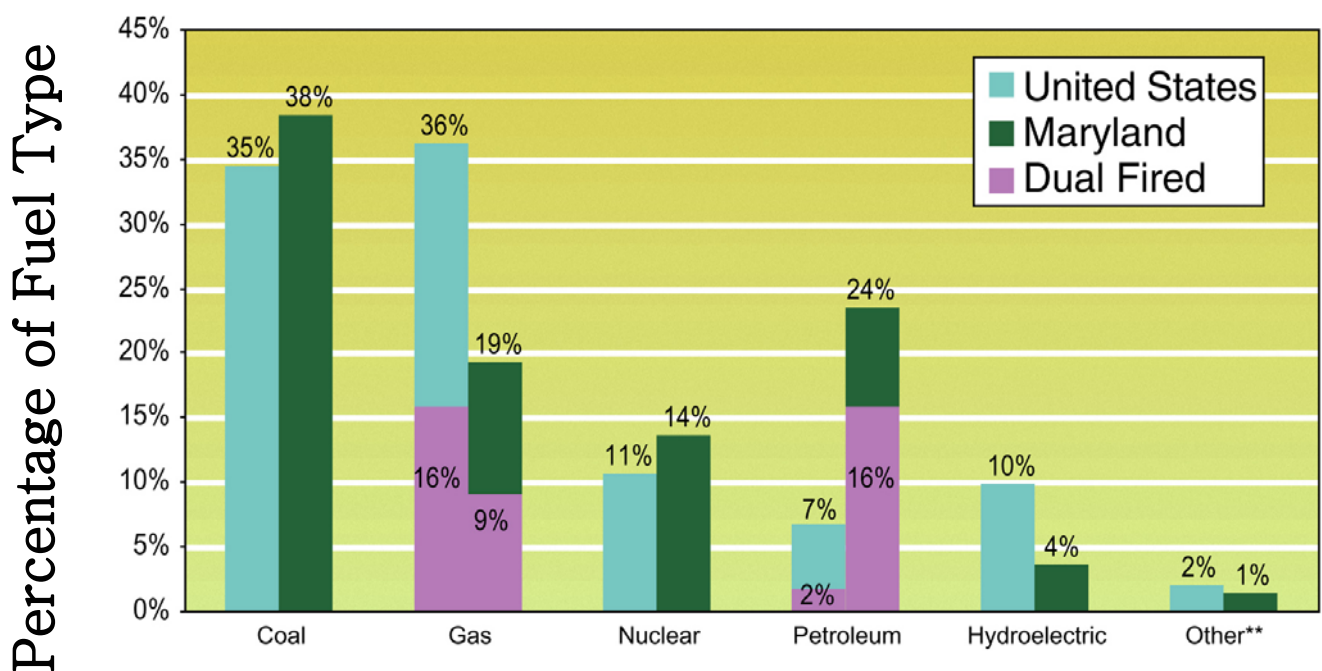
Figure 1: Sketch of Electricity Generation from a Combustion Turbine

# How is Electricity Produced?

## 2.2 Power Plants in Maryland

### Activity B: Power Plants and Types of Fuel

#### Teacher Answer Sheet



For the natural gas and petroleum capacity amounts, the smaller columns represent the dual fired generation capacity that uses the referenced energy source as the primary fuel. Dual fired capacity includes generators that can burn petroleum-based fuels or natural gas. As an example, natural gas is currently used to power 36% of the total U.S. generation capacity: 20% is limited to only using natural gas, 16% can switch to petroleum-based fuels.

\*\*Other capacity includes renewable generators, as well as waste, chemical, and other miscellaneous generation sources.

Source: Energy Information Administration.

#### Fuel Type

# APPENDIX B

## *Online Energy Resources*

## Maryland Agencies

- Maryland Department of Natural Resources: <http://www.dnr.state.md.us/ed/checkup.html>
- Maryland Energy Administration: <http://www.energy.state.md.us/>
- Maryland Power Plant Research Program: <http://www.dnr.maryland.gov/bay/pprp/>
- Maryland Public Service Commission: <http://www.psc.state.md.us/psc/home.htm>

## Utilities

### Maryland Distribution Utilities

- Allegheny Power: <http://www.alleghenypower.com/>
- Baltimore Gas and Electric Company: <http://www.bge.com/>
- Conectiv Power Delivery: <http://cpd.conectiv.com/>
- Pepco: <http://www.pepco.com/>

### Maryland Electric Cooperatives and Municipal Systems

- A & N Electric Cooperative: <http://www.anecop.com/>
- Choptank Electric Cooperative, Inc.: <http://www.choptankelectric.com/>
- Southern Maryland Electric Cooperative: <http://www.smeco.com/>
- Easton Utilities: <http://www.eastonutilities.com>

## Federal Agencies

- Department of Energy (DOE): <http://www.energy.gov/index.html>
- Energy Information Agency (EIA), DOE: <http://www.eia.doe.gov/>
- Environmental Protection Agency: <http://epa.gov/acidrain>
- Federal Energy Regulatory Commission: <http://www.ferc.fed.us/>
- US Geological Survey: <http://www.ga.water.usgs.gov/acidrain.html>

## National & Regional Associations

- National Association of Regulatory Utility Commissioners (NARUC): <http://www.naruc.org/>
- National Rural Electric Cooperative Association (NRECA): <http://www.nreca.org/>
- Pennsylvania-New Jersey-Maryland Interconnection, LLC: <http://www.pjm.com/>
- North American Electric Reliability Council: <http://www.nerc.com/>
- Mid-Atlantic Area Council: <http://www.nerc.com/regional/maac.html>
- East Coast Area Reliability Agreement: <http://www.nerc.com/regional/ecar.html>

# APPENDIX C

## *Glossary*

Acid	A substance with a pH of less than 7 (neutral)
Acid Deposition	Acid Rain
Acid Rain	Rainfall with a pH below normal (5.6)
Anadromous up	A type of fish that spends most of its life at sea but swims river to spawn
Audit	Examination and review of a specific task
BTU	British Thermal Units – A unit of energy measurement. One BTU is approximately equal to the energy released in the burning of a wood match
Base	That which has a pH greater than 7 (neutral)
Charge	A definite quality of electricity
Combustion	A chemical process that gives off light and heat
Conduit	Pipe that carries water through a dam
Consumption	The use of goods to satisfy wants
Contaminated item(s)	To make unfit for use by the introduction of unwanted
Current Electricity	The flow of electricity through a path
Deforestation	The action or process of clearing a forest
Deposition	Air pollutants that eventually return to the earth's surface and are deposited directly on the landscape and in bodies of water
Draft	An air current in a closed-in area
Dredge	To dig, gather or pull up
Electrical Energy	Energy produced by electrons moving through wires
Electron	A subatomic particle with a negative electrical charge
Emission	Substances discharged into the air (as by a smokestack or automobile gasoline engine)

Emitted	To throw, give off or send out
Energy Conservation	The practice of extending the useful life of the earth's energy resources through wise and efficient management
Energy Efficient	The ability to do work using the least amount of resources
Energy Production	The making of usable power
Environmentalism	A person concerned about the quality of the environment
Export	Something useful or valuable sent to another country or region
Filament	A single thread (usually tungsten) that gives off light by the passage of an electrical current through it
Fission	Breaking atoms into smaller parts.
Fluorescent Lighting	Produces light by using a gas tube coated on the outside with phosphorescent substances filled with gas
Fossil Fuel	Coal, oil, natural gas
Generation	The process of producing electricity
Generator	A machine that changes mechanical energy into electrical energy
Hydroelectricity	The use of the energy of flowing water to produce electricity
Import	A commodity brought into our country from another country or region
Incandescent Lighting	Producing light by the flow of electricity through a filament, heating it until it glows
Kilowatt	One thousand watts of electricity; the unit by which a utility measures a customer's power demand
Kinetic Energy	The energy of motion
Mechanical Energy	The form of kinetic energy possessed by a moving object or machine.



Moratorium	A law that prohibits an action for a certain period of time.
Natural Resource	Something from nature that people need or want such as water, coal, soil and forests
Neutral	A substance that is neither an acid nor a base; it has a pH of 7
Neutrons	A subatomic particle with no charge
Nitrogen Oxides (No <sub>x</sub> )	Gases formed when high temperature combustion combines nitrogen and oxygen. Nitrogen oxides combine with water in the atmosphere to produce acidic precipitation (acid rain)
Nuclear Energy	Energy released by nuclear fission and used to generate electricity
Particulate Matter	Dust, smoke, soot, or aerosol particles which remain suspended in the air until they clump together to form larger particles and settle to earth. Particulate matter can also become nuclei to attract water vapor and form rain droplets.
pH	Expresses the degree of acidity or basicity. pH ranges from 0 to 14 where 7 is neutral above 7 is basic and below 7 is acidic.
Per Capita	Per person
Petajoules	A figure used for expressing large quantities of energy such as national or world figures
Phosphorescent	Emitting light without appreciable heat as by slow oxidation of phosphorous
Potential Energy	Stored energy
Proton	A subatomic particle with a positive electric charge
Pulverized Coal	Coal that is crushed, beat or ground into a fine powder
Repel	To push away
Revolution	One complete spin
Rotor	The rotating core of a generator whose motion helps produce electric current

Scrubber	A device for removing impurities
Shaft	Connects the turbine to the generator
Spawn	To produce and deposit eggs in a waterway
Static Electricity	Unbalanced, stationary electric charges
Stationary	Staying in one place
Stator	The stationary generator part within which the rotor spins; electric current is produced in the stator.
Sulfur Dioxide (SO <sub>2</sub> )	A gas given off when fossil fuels such as coal are burned when combined
Toxic	Poison
Transformer	A device that can increase or decrease the voltage of an electrical outlet
Turbine	A bladed wheel made to turn by the pressure of water, steam, or air against its blades
Voltage	The force that pushes electric current along a circuit
Watt	A unit measuring electricity

# APPENDIX

## *Service Learning Project Ideas*

### ***Educate Others***

- ❖ Write articles for newspapers on Energy Conservation.
- ❖ Construct pamphlets on how to weather strip (windows, doors) and carpooling to reduce acidic precipitation.
- ❖ Do an energy conservation project for school
- ❖ Do cross-age teaching on Energy Conservation.
- ❖ Conduct an Energy Fair to educate others; include models and demonstrations in Power UP.
- ❖ Evaluate and implement an energy audit on a community building.

### ***Potential Funding Source***

Chesapeake Bay Trust  
60 West Street  
Suite 200A  
Annapolis, MD 21401  
410-974-2941  
Email: [postmaster@cbtrust.org](mailto:postmaster@cbtrust.org)  
<http://www.chesapeakebaytrust.org/>

# APPENDIX

## *Reference*

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Wisconsin Electric Power Company, Energy 90's: Learning About Science, Technology and Society, 1991.